

Solutions
 King Fahd University of Petroleum & Minerals
 Department of Mathematical Science
 STAT-211-Term052
 Quiz #7

Name:

ID:

Section:

Serial:

Q1. (4-Points)

Answer the following questions as True if the statement is true and False if not.

- A point estimate for the population mean will always fall within the confidence interval estimate. **True**
- The t-distribution is used to obtain the critical value in developing a confidence interval when the population distribution is not known and the sample size is small. **True**
- Increasing the sample size will result always in a point estimate that is closer to the true population value. **False**
- The purpose of a pilot sample is to provide an idea of what the population standard deviation might be. **True**

Q2 (6 points)

In an application to estimate the mean number of miles that downtown employees commute to work roundtrip each day, the following information is given: $n = 20$, $\bar{x} = 4.33$, $S = 3.50$, then answer the following:

- What is the point estimate for the true population mean?

① A point estimate = $\bar{x} = 4.33$

- Obtain a 95% confidence interval for the population mean.

$$1 - \alpha = .95 \Rightarrow \alpha = .05$$

$$t_{\alpha/2, n-1} = t_{.025, 19} = 2.0930$$

A 95% C.I. for μ is:

$$\bar{x} \pm t_{\alpha/2, n-1} \cdot \frac{S}{\sqrt{n}} = 4.33 \pm (2.0930) \cdot \frac{3.5}{\sqrt{20}}$$

$$4.33 \pm 1.6380$$

$$[2.6920, 5.9680]$$

③

- If the sample given is a pilot how many additional observations are required to estimate the population mean with 99% confidence interval and a margin of error of ± 0.5

$$1 - \alpha = .99 \Rightarrow \alpha = .01 \Rightarrow Z_{\alpha/2} = Z_{.005} = 2.575$$

$$n = \left(\frac{(2.575)(3.5)}{.5} \right)^2 = 324.9 \approx 325$$

②

The number of additional observations = $325 - 20 = 305$